Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application. Please amend claims 1 and 3-5, as follows:

Listing of Claims:

1. (Currently Amended) An optical device comprising at least two waveguides in at least one propagation layer of grating material, a first one of said waveguides adapted for transporting input radiation from a first input port to output radiation exiting from a first output port and a second one of said waveguides transporting input radiation from a second input port to output radiation exiting from a second output port, and a one- or two- dimensional (binary) supergrating in a modulation layer of grating material for coupling input radiation propagating from one of said first and second input ports along a corresponding waveguide to the other of said first and second waveguides; and

wherein said one- or two- dimensional supergrating comprises an array of discrete pixels and an array of controllable means each coupled to one of the discrete pixels, the controllable means being responsive to a set of control signals, for altering the modal index of refraction value in corresponding discrete pixels in said array in at least two modes.

2. (Original) A device according to claim 1, in which said one- or two-dimensional supergrating couples input radiation in said first waveguide traveling in a first direction to said second waveguide traveling in a second direction substantially parallel to said first direction.

3. (Currently amended) A device according to claim 1, in which said one- or two- dimensional supergrating couples input radiation in said first waveguide ~~travelling~~ traveling in a first direction to said second waveguide, traveling in a second direction substantially opposite to said first direction.

4. (Currently Amended) ~~A device according to claim 1, in which~~ An optical device comprising at least two waveguides in at least one propagation layer of grating material, a first one of said waveguides adapted for transporting input radiation from a first input port to

output radiation exiting from a first output port and a second one of said waveguides transporting input radiation from a second input port to output radiation exiting from a second output port, and a one- or two- dimensional (binary) supergrating in a modulation layer of grating material for coupling input radiation propagating from one of said first and second input ports along a corresponding waveguide to the other of said first and second waveguides; and

wherein said first and second waveguides are symmetric and said one- or two-dimensional supergrating comprises a central portion between said first and second waveguides having a first pattern of high and low values of index of refraction and first and second outer portions having a second pattern of high and low values of index of refraction having the opposite sense to said first pattern, whereby said one- or two- dimensional supergrating suppresses back reflection in said first and second waveguides.

5. (Currently amended) A device according to claim 1, ~~in which said two dimensional supergrating comprises an array of controllable means, responsive to a set of control signals, for altering the modal index of refraction value in corresponding pixels in said array in~~ wherein the at least two modes ~~including~~ include a first mode in which said device couples input radiation in said first waveguide ~~travelling~~ traveling in a first direction to said second waveguide traveling in a second direction substantially parallel to said first direction and a second mode in which said device couples input radiation in said first waveguide ~~travelling~~ traveling in a first direction to said second waveguide traveling in a second direction substantially opposite to said first direction.

6. (Original) A device according to claim 5, in which said one- or two-dimensional supergrating comprises an array of controllable means responsive to a set of control signals that are adapted to switch radiation of any of N different wavelengths between said first and second waveguides in said first and second modes in response to corresponding values of said control signal, whereby said device may be controlled to pass radiation in any one of N wavelengths from any of said input ports to any of said output ports, thereby forming a wavelength-dependent supergrating 2x2 coupler.

7. (Currently Amended) A device according to claim 1, ~~in which said one- or two- dimensional supergrating comprises an array of controllable means, responsive to a set of~~

~~control signals, for altering the index of refraction value in corresponding pixels in said array in~~ wherein the at least two modes ~~including~~ include a first mode in which said device couples input radiation in said first waveguide to said second waveguide and a second mode in which said device couples input radiation in said second waveguide to said first waveguide.

8. (Original) A device according to claim 7, in which said one- or two-dimensional supergrating comprises an array of controllable means responsive to a set of control signals that are adapted to switch radiation of any of N different wavelengths between said first and second waveguides in said first and second modes in response to corresponding values of said control signal, whereby said device may be controlled to pass radiation in any one of N wavelengths from any of said input ports to any of said output ports, thereby forming a wavelength-dependent supergrating 2x2 coupler.

9-15. (Canceled)

16. (Currently Amended) A device for processing optical radiation in a set of wavelengths comprising a set of waveguides, each waveguide having at least one input port and at least one output port, in which an input beam of radiation traveling on an input waveguide of the set of waveguides passes through at least one wavelength dependent supergrating coupler that couples a selected wavelength band in or out of the input waveguide, so that the remaining optical beam in the input waveguide has a wavelength range that has been added to or subtracted from by the selected wavelength band; and

wherein said wavelength dependent supergrating coupler comprises an array of discrete pixels and an array of controllable means each coupled to one of the discrete pixels, the controllable means being responsive to a set of control signals, for altering the modal index of refraction value in corresponding discrete pixels in said array in at least two modes.

17. (Original) A device according to claim 16, in which said wavelength dependent supergrating coupler adds radiation from a second input port to said input beam.

18. (Original) A device according to claim 16, in which said wavelength dependent supergrating coupler subtracts radiation in a wavelength subtraction range from said input beam.

19. (Original) A device according to claim 16, in which at least two supergrating couplers are connected in series, with a first supergrating coupler controlling a first wavelength range and a second supergrating coupler controlling a second wavelength range.

20-29. (Canceled)

30. (Original) An optical device comprising an input port for receiving incident radiation and directing the radiation on an array of pixels comprising a supergrating, each pixel having a modal index of refraction selected from a set of index values, the array of pixels collectively processing the incident radiation and directing at least one beam of output radiation to at least one output port, in which at least some of the array of pixels are connected to control means for controllably setting the value of the modal index of refraction of the corresponding pixels in response to a control signal, so that the process applied to the incident radiation may be determined by the control signals applied to the control means.

31-62. (Canceled)

63. (New) An optical device comprising:

first and second optical wave transmitting means;

a means for coupling optical signals between the first and second optical wave transmitting means;

a one- or two-dimensional array of pixels disposed on the coupling means, the pixels each comprising a means for altering a modal index of refraction value in at least two modes in discrete locations on said coupling means; and

a means for controlling the modal index of refraction altering means to effect a one- or two-dimensional (binary) wavelength dependent supergrating in the coupling layer.

64. (New) The optical device of claim 63, wherein the first and second optical wave transmitting means are first and second wave guides, each waveguide having at least one input port and at least one output port.

65. (New) The optical device of claim 63, wherein modal index of refraction altering means comprise actuated beams selectively movable relative to the coupling means.

66. (New) The optical device of claim 63, wherein the coupling means is a modulation layer optically coupled to the first and second optical wave transmitting means.

67. (New) The optical device of claim 63, wherein the modal index of refraction altering means each comprise at least one of a thermal, electro-optic, magneto-optic, opto-restrictive, mechanical strain, current injection, optical illumination, liquid crystal, reconfigurable molecule, chemical interaction, and mechanical translation device.

68. (New) The optical device of claim 63, wherein each of the plurality of pixels is at least one of triangular, hexagonal, or rectangular shaped.

69. (New) A method for controlling optical radiation comprising:

applying a pattern of control signals to discrete pixels in a one- or two-dimensional array of discrete modal index altering means to effect a supergrating on a modulation layer disposed on first and second waveguides;

inputting radiation into the first waveguide; and

coupling a portion of the input radiation through the modulation layer to the second waveguide, the coupled portion corresponding to a wavelength corresponding to the pattern of control signals.

70. (New) The method of claim 69, wherein applying the pattern of control signals to discrete pixels in the one- or two- dimensional array of discrete modal index altering means to effect the supergrating on the modulation layer comprises applying a pattern of

voltages to an array of electrically addressable electrodes disposed on the modulation layer to establish a supergrating on the modulation layer.

71. (New) The method of claim 69, wherein applying the pattern of control signals to discrete pixels in the one- or two- dimensional array of discrete modal index altering means to effect the supergrating on the modulation layer comprises actuating a first subset of a plurality of microelectromechanical system (MEMS) fingers to touch the modulation layer to establish a supergrating on the modulation layer.

72. (New) The method of claim 71, further comprising actuating a second subset of the plurality of MEMS fingers to move away from the modulation layer.

73. (New) The method of claim 69, wherein coupling a portion of the input radiation through the modulation layer to the second waveguide comprises coupling the input radiation in the first waveguide traveling in a first direction to the second waveguide traveling in a second direction substantially opposite to the first direction.

74. (New) The method of claim 69, wherein applying the pattern of control signals to discrete pixels in the one- or two- dimensional array of discrete modal index altering means to effect the supergrating on the modulation layer disposed on first and second waveguides comprises applying a first pattern of control signals to the discrete pixels to effect a first supergrating coupling input radiation in the first waveguide traveling in a first direction to the second waveguide traveling in a second direction substantially parallel to said first direction, the method further comprising applying a second pattern of control signals to the discrete pixels to effect a second supergrating coupling input radiation in the first waveguide traveling in a first direction to the second waveguide traveling in a second direction substantially opposite to said first direction.